

# PATENT SPECIFICATION

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COMPLETE SPECIFICATION

DRAWINGS ATTACHED

U. S. PATENT OFFICE

Improvements relating to Pipe Joints

WE, STEWARTS AND LLOYDS OF NEW ZEALAND LIMITED, a Company organized under the laws of New Zealand, of Shell House, The Terrace, Wellington, New Zealand, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to pipe joints and more particularly relates to joints such as spigot and socket or spigot and faucet joints of the kind that may be used in tubular constructions such as scaffolding, supports, 15 or tubular gates.

In joints of the kind referred to, and in order to obtain a stable or at least substantially rigid joint, it is necessary that the latitudinal dimensions of the spigot and 20 the socket are closely similar so that the spigot is a good tight fit in the socket or, alternatively, where the spigot is a loose fit within the socket then suitable packing must be inserted in the space created so as 25 to form a tight joint.

It is the object of this invention to provide, for a spigot and socket and the like joint, a means whereby a stable joint can be obtained without the need for providing a spigot and a socket of substantially 30 the same latitudinal dimensions and without the need for providing packing between the spigot and the socket in order to obtain a rigid or stable joint.

35 According to this invention the improved pipe joining means comprises the provision, at a spigot and socket joint of stabilising means having an arrangement and formation whereby minor variations in the latitudinal dimensions of the spigot and of the 40 socket, and/or irregularities on either of the complementary surfaces of the spigot and the socket wall can be accommodated in

providing a stable joint between the spigot and the socket of a pipe joint, said stabilising means being in the form of a plurality of longitudinally disposed raised fins which are provided on the outer surface of the spigot and have relatively sharp outer edge portions which are engageable with the said 50 socket wall, said fins being of a tapered formation lengthwise and having the smallest ends thereof towards the end of the spigot which is arranged for insertion into the socket so as to gradually increase 55 in latitudinal dimensions away from such end.

This invention is applicable to pipes of circular or rectangular (or any other) cross-section and to spigots of complementary 60 cross-sections, and to spigots which are solid or hollow, but preferred forms of this invention will now be described with reference to the accompanying drawings in which:—

Figure 1 is a side elevation of a solid 65 spigot of circular cross-section having one form of the stabilising means provided on the outer surface thereof.

Figure 2 is an end elevation of the spigot member illustrated in Figure 1 and as 70 viewed in the direction of arrows II-II.

Figure 3 is a side elevation of a double ended solid spigot member, of the kind illustrated in Figure 1 and 2, joining two pipes of circular cross-section; the pipes 75 being shown in partial longitudinal section and the end portions of the bores of both pipes being the sockets wherein the respective ends of the spigot are accommodated.

Figure 4 is a fragmentary view, on a 80 larger scale, of a solid spigot member of the kind illustrated in Figures 1 and 2 and a section of pipe (shown in longitudinal section) and illustrates more particularly the fitting of a section of pipe onto the spigot 85 and how minor variations in the bore (or

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socket) diameter of the pipe can be accommodated.

Figures 5 and 6, illustrate two different ways in which the joint can be made secure after it has been formed, the spigots and securing means being shown in full side elevation and the fitted pipes being shown in longitudinal section.

Figures 7 and 8 illustrate another way of making the joint secure simultaneous with the forming of the joint, the spigot and securing means being shown in full side elevation in Figure 7 (the pipe being shown in longitudinal section) and Figure 8 being a view in the direction of arrows VII-VIII of Figure 7.

Figures 9 and 10 are longitudinal section and end view respectively, of a second form of this invention wherein the stabilising means is formed in the bore or socket of the pipe, and

Figure 11 illustrates how this second form of the invention may be employed by accommodating a plain spigot in the end of the bore or the socket of the pipe, the view of the joint being a side elevation with a portion of the wall of the pipe socket broken away.

In the forms of this invention illustrated in Figures 1 to 8, the spigot 1 is in the form of a solid peg of circular cross-section and has a diameter smaller than that of the socket 2 into which it is to be inserted; the socket 2 in these cases being the bore of a pipe 3. The spigot 1 is provided on its outer surface with a plurality (for example there may be three or more) of longitudinally disposed raised and tapered stabilising fins 4. Such fins 4 are of uniform dimensions and are arranged with the smallest ends thereof towards the end of the spigot 1 which is arranged for insertion into the socket 2 and gradually increase in latitudinal dimensions away from such end so that, in a spigot of circular cross-section arranged for insertion into a circular socket, as illustrated, the diameter measured on the outer surfaces of the said fins 4 gradually increases away from the end of the spigot 1 arranged for insertion into the socket 2. The fins 4 are preferably spaced substantially equidistant around the outer surface of the spigot 1 and are preferably substantially triangular in cross section as shown so as to provide leading or outer edges 5 which are relatively sharp so that the spigot 1 can be inserted into a socket, or the bore of a pipe, having a diameter which is slightly larger than the external diameter of the spigot 1 and the said leading or outer edges 5 of the fins 4 will engage with the surface of the wall surrounding the bore or socket 2, the tapered formation of the fins 4 facilitating the insertion of the spigot 1 into the said bore or socket 2 until such time as the gradually

increasing outer diameter of the fins 4 corresponds with the diameter of the bore or socket 2 of the pipe 3.

In a preferred form of this invention, and with reference now to Figure 4 of the drawings, the spigot 1 is made from a slightly softer and preferably lighter material than the material of which the pipe 3 having the corresponding socket 2 is made; for example the spigot 1 may be made from a cast aluminium alloy for use with a pipe of a harder metal, so that when the spigot 1 and pipe 3 are forcibly engaged the leading peripheral edge 6 of the socket 2 or bore of the pipe 3 can, where necessary, shave the outer edges 5 of the stabilising fins 4 as shown and with a minimum of resistance so that the spigot 1 can fit accurately and tightly in the bore or socket 2 of the pipe 3. It will be appreciated that the use of a light weight material for the construction of the spigot 1 will also facilitate handling and substantially reduce freight costs.

Thus it will be seen that a spigot having a stabilising means in the form of such tapered fins can be accommodated in pipe bores or sockets having minor variations in diameter and also that, by virtue of the spacing of the fins and the relatively sharp outer edges thereof, irregularities in or on the wall surface surrounding the bore or socket can be accommodated and a relatively stable and rigid joint can be obtained.

Once the spigot 1 is placed in position within the socket 2 or bore of the pipe 3, i.e. once the joint is formed or made, the joint can be made secure by various means and for example may be made secure, as shown in Figure 5, by the insertion of a pin or rivet through suitable holes made through the wall of the pipes 3 and the spigot 1 or, as shown in Figure 6, by a screwthreaded member 8 being threaded through the wall of the pipe 3 to bear on the spigot 1. Further, and as shown in Figures 7 and 8, securement may be made by utilising a joining means such as that described in our Patent No. 1045296 in the form of a plate 9 of spring material which is secured to the end of the spigot 1 such as by screwing or rivetting the medial portion of the plate to the end of the spigot 1; said plate 9 being normally slightly larger in diameter than the diameter of the socket 2 or bore of the pipe 3 and having its outer peripheral edge portion relieved with slots or recesses so that said plate 9 can be flexed and deformed into a dish-like formation when the socket 2 or pipe 3 is forced over said plate 9 and spigot 1 in forming the joint, the outer peripheral edge of said plate 9 being arranged to conform with and extend over and grip the inner surface of the wall of the socket 2 or pipe bore.

The plate 9 can be substantially flat prior to the joining operation being carried out or can be slightly dished so that a greater degree of dishing is assumed by the plate 9 after the joint has been formed.

In another form of this invention illustrated in Figures 9, 10, and 11, raised and tapered and longitudinally disposed stabilising fins 10, similar to those above described for spigot 1, are formed or provided at equidistant spacing on the surface of the socket wall surrounding the bore or socket 11 of a pipe 12 so that the smallest ends of the tapered fins 10 are towards the open end of the socket 11 or bore of the pipe 12 and the fins 10 project inwardly towards the axis of the said bore or socket 11 so that, as a plain spigot 13 is inserted into the socket or bore 11 of the pipe 12, the outer surface of the spigot 13 comes into engagement with the leading or inner edge 14 of the fins 10 to thus form a stable or rigid joint similar to that previously described with reference to Figures 1 to 8 of the drawings.

It will be appreciated that, in this latter form of the invention, the spigot member 13 is preferably of harder material than that of the pipe 12, or more particularly the stabilising fins 10 of the pipe bore or socket 11, and/or the leading peripheral edge 15 of such spigot 13 is relatively sharp so that the leading or inner edge 14 of the fins 10 can be shaved, in a similar manner to that described with reference to Figure 4 of the drawings and where necessary, by such spigot leading edge 15 upon forcibly forming the joint. Furthermore, once the joint has been formed, the joint can be made secure in similar ways (not illustrated) to those described with reference to Figures 5 and 6 of the drawings i.e. by the insertion of a pin or rivet through suitable holes made through the wall of the pipe 12 and the spigot 13, or by a screw threaded member being threaded through the wall of the pipe 12 to bear on the spigot 13.

The invention has been generally described so far with reference to a single joint, with the exception of the double joint illustrated in Figure 3 of the drawings, but it will be appreciated that in various modifications angled, elbow, single and double T, and the like joints can be made by accordingly so forming the spigot member.

Also, as previously mentioned, this invention is applicable to pipes of other than circular cross-section, the complementary spigots being formed accordingly.

Thus by this invention stable or rigid spigot and socket, or spigot and faucet, joints can be made even when there are minor discrepancies in the latitudinal dimension, of the sockets and pipes and when there are irregularities on the outer surface of the spigot or on the surface of

the wall surrounding the bore or socket. Pipe joining means according to the present invention may be used in association with the means for providing a tubular construction joint described and claimed in our co-pending application No. 17552/64 (Serial No. 1067091).

#### WHAT WE CLAIM IS:-

1. A pipe joining means comprising the provision, at a spigot and socket joint, of stabilising means having an arrangement and formation whereby minor variations in the latitudinal dimensions of the spigot and of the socket, and/or irregularities on either of the complementary surfaces of the spigot and the socket wall can be accommodated in providing a stable joint between the spigot and the socket of a pipe joint, said stabilising means being in the form of a plurality of longitudinally disposed raised fins which are provided on the outer surface of the spigot and have relatively sharp outer edge portions which are engageable with the said socket wall said fins being of a tapered formation lengthwise and having the smallest ends thereof towards the end of the spigot which is arranged for insertion into the socket so as to gradually increase in latitudinal dimensions away from such end.

2. A pipe joining means as claimed in claim 1 wherein the fins are substantially triangular in cross section so as to provide leading or outer edges which are relatively sharp.

3. A pipe joining means as claimed in claim 1 or claim 2, wherein the fins are spaced substantially equidistant around the outer surface of the spigot.

4. A pipe joining means as claimed in any one of the preceding claims wherein the spigot is manufactured from a material which is slightly softer than that of the socket wall.

5. A pipe joining means as claimed in any one of the preceding claims wherein the spigot is manufactured from a relatively light weight material such as aluminium alloy.

6. A pipe joining means comprising the provision at a spigot and socket joint, of stabilising means having an arrangement and formation whereby minor variations in the latitudinal dimensions of the spigot and of the socket, and/or irregularities on either of the complementary surfaces of the spigot and the socket wall can be accommodated in providing a stable joint between the spigot and the socket of a pipe joint, said stabilising means being in the form of a plurality of longitudinally disposed fins which are provided on the surface of the socket wall so as to project inwardly towards the axis thereof, said fins having relatively sharp inner edge portions which are engageable with the outer surface of the

spigot.

7. A pipe joining means as claimed in claim 6, wherein the fins are of a tapered formation lengthwise and have the smallest ends thereof towards the open end of the socket.

8. A pipe joining means as claimed in claim 6 or claim 7 wherein the fins are substantially triangular in cross section so as to provide leading or inner edges which are relatively sharp.

9. A pipe joining means as claimed in claim 6, claim 7 or claim 8, wherein the fins are spaced substantially equidistant around the surface of the wall surrounding the socket.

10. A pipe joining means as claimed in any one of claims 6 to 9 inclusive wherein the spigot is of a harder material than that of the stabilising fins.

11. A pipe joining means as claimed in any one of claims 6 to 10 inclusive wherein the leading peripheral edge of the spigot is relatively sharp.

12. A pipe joining means as claimed in any one of the preceding claims wherein the spigot and socket wall are adapted to receive a securing pin or rivet whereby the formed joint can be secured, substantially as described with reference to Figure 5 of the accompanying drawings.

13. A pipe joining means as claimed in

any one of claims 1 to 12 inclusive wherein the socket wall is provided with a screw threaded member which is adapted to bear on the spigot and secure the formed joint, substantially as described with reference to Figure 6 of the accompanying drawings.

14. A pipe joining means as claimed in any one of claims 1 to 5 inclusive wherein the spigot is provided with a plate of spring material, said plate being secured to the end of the spigot and having an edge which is adapted to extend over and grip the surface of the socket wall as the joint is formed, 45 substantially as described with reference to Figures 7 and 8 of the accompanying drawings.

16. An improved pipe joining means arranged and constructed and adapted for use substantially as herein described with reference to Figures 1 to 4 of the accompanying drawings.

17. An improved pipe joining means arranged and constructed and adapted for use substantially as herein described with reference to Figures 9 and 10 and 11 of the accompanying drawings.

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MAY 1967

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## COMPLETE SPECIFICATION

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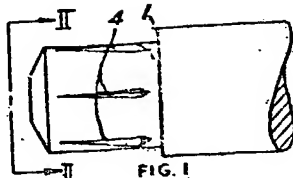


FIG. 1

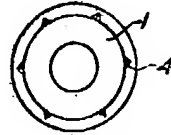


FIG. 2

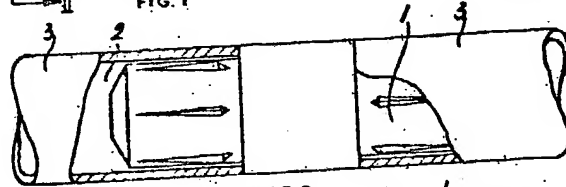


FIG. 3

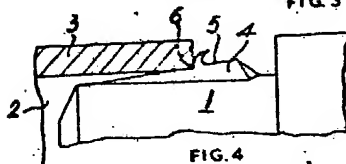


FIG. 4

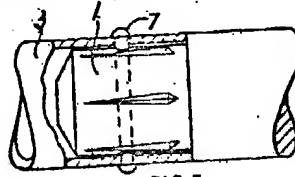


FIG. 5

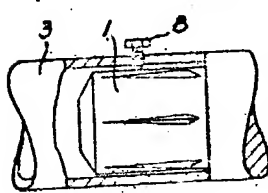


FIG. 6

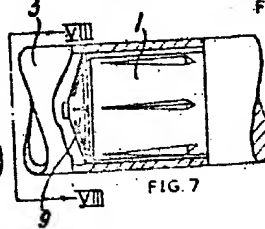


FIG. 7

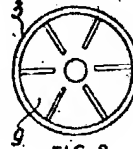


FIG. 8

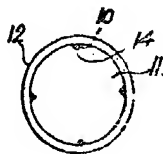


FIG. 10

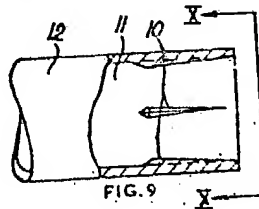


FIG. 9

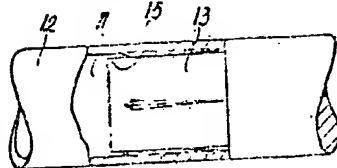


FIG. 11

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